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DETONABILITY OF LX-17 UNDER MULTIPLE SHOCK LOADING*

P.A. Urtiew, C.M. Tarver, F. Garcia and W.C. Tao

Lawrence Livermore National Laboratory
Livermore, CA 94550

The single shock pulse initiation of the insensitive TATB-based high explosive LX-17 has been intensively studied over a wide range of initial temperatures. However, many hazard scenarios can involve multiple shock compression of the explosive. Therefore, the objectives of this research were to experimentally measure the reaction rates of LX-17 in multishock tests and to develop the reactive flow computational model which can be used to predict the response of LX-17 in scenarios that cannot be tested directly.

Three series of four inch gun experiments were conducted using embedded manganin pressure gauges to determine pressure histories at several locations in the reacting LX-17. One series of experiments examined the possibility of increasing the reaction in shocked, decomposing LX-17 subjected to a second shock wave reflected from an inert material that was at the end of the explosive. The second series of experiments looked into the effect of a second shock following the first one in the same direction. The third series of experiments examined the collision of reacting shock waves in LX-17 to form a high pressure, high temperature Mach stem region. In this region LX-17 should react much more rapidly.

The first two cases shoved evidence of "dead pressing" behind the first shock preventing the second one to cause any significant increase of reaction in LX-17 even if the second shock was strong enough to cause detonation by itself if it were not preceded by the first one. The third case demonstrated that two (or perhaps more) colliding shock waves in LX-17 can produce more vigorous reaction that can even lead to transition to detonation even if the primary shocks were not strong enough to do that.

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